

EURATOM SUPPLY AGENCY

Annual Report for 1978

ANNUAL REPORT
OF THE
EURATOM SUPPLY AGENCY
FOR 1978

I.

THE DEVELOPMENT OF NUCLEAR ENERGY IN THE COMMUNITY

As in previous years, the development of nuclear power in the Community as a whole proceeded at a restrained pace in the period under review. In some instances the basic decisions on whether to introduce nuclear power or extend existing capacity were postponed to the beginning of the 1980s on account of the political importance of these questions and pending clarification of other aspects. In addition to the need for continued wide-ranging and publicly conducted discussion of safety and environmental protection matters, sometimes arising from the rejection of nuclear power in principle, further enquiries are centred particularly on questions in the fields of waste disposal and reprocessing. Even forecasts of trends in energy consumption have been increasingly more cautious. On top of this there has been more and more emphasis on measures for saving energy as a contribution to meeting energy requirements.

In most Member States, where there are already nuclear power programmes, further expansion also generally encountered difficulties resulting in delays, postponements and rethinking. Apart from the factors already mentioned which govern the argument surrounding nuclear power, other problems originating in the particular positions of the countries concerned arise in this context, for example, the siting of new nuclear power stations or the role of other sources of energy, especially the preferential consumption of available coal reserves. Only in France was the development programme carried out consistently and with few delays.

In total four new nuclear power stations were newly commissioned in the Community in 1978. Three nuclear power plants comprising 6 reactors and a total capacity of 4,310 MWe were firmly committed and ordered. At the year-end 1978/1979 the total nuclear capacity in the Community amounted to 26.3 GWe. Out of the net electricity production in the Community in 1978 of some 1.12 million GWh, approximately 10.2% was produced from nuclear energy. This represents a saving of the order of 25 million tonnes of oil equivalent.

The fuel requirements for the nuclear power stations in the Community with a total capacity of 26.3 GWe at the end of the year amounted to ca. 8000 tonnes of natural uranium and of ca. 3400 tonnes of separative work. In regard to the attainment of the objectives of the Community for 1985, further delays occurred in the period under review. The latest forecasts predict a total installed capacity of 78 GW(e) for 1985 and 127-137 GW(e) for 1990. By way of comparison, attention may be called once more to what the relevant forecasts were in, for example, 1973 and 1976. They predicted respectively 46-55 and 48 GW(e) for 1980, 126-140 and 126.6-133.6 GW(e) for 1985 and 271-300 and 221.7 - 240.6 GW(e) for 1990. At its meeting in Bremen on 6th and 7th July 1978 the European Council, however, again declared that the contribution of nuclear energy, alongside other forms of energy, is vital and a matter of urgency for the Community. The recent events in the oil sector underline the importance of this decision.

NON PROLIFERATION AND FUEL SUPPLY

The relationship between measures under non-proliferation policy and nuclear fuel supply was clearly demonstrated in the context of the Agency's operations by the temporary suspension of deliveries from the United States after the entry into force of the Nuclear Non-Proliferation Act on 10 March 1978. Besides the repercussions which may follow from decisions on certain fuel cycles, (e.g. due to possible reservations on reprocessing and restrictions on the use of plutonium, and the likely resultant pressures on natural uranium reserves and the natural uranium price trend), it is especially experience with the Canadian and American suspensions of delivery that is causing not only consumers but also producers in the Community to follow the work of the International Fuel Cycle Evaluation (INFCE) with special interest. The first plenary conference of the some 40 States and international organisations participating in INFCE was held in November 1978. The conference was informed of the status of the work of the eight Working Parties and decided the further action to be taken. The concluding conference is to be held at the end of February 1980. Special mention may be made at this point of Working Group 3, which, in the problem area of

supply and non-proliferation, will examine, inter alia, the following problems:

- inducements for long-term contracts between producers and consumers, including factors such as supply, demand and price which affect market stability;
- guarantees for secure supply under national import, export and non-proliferation policies;
- multinational or international mechanisms for guaranteeing delivery on time in the event of a delay in or interruption of supply.

The results of the examination of these questions and any conclusions reached, especially on problems of long-term contractual security of supplies and possible support measures will certainly not be without interest to the Agency in its work.

II.

MAIN ACTIVITIES OF THE AGENCY

The main points of emphasis in the Agency's activities in the period under review can be summarized as follows:

- (1) Owing to the cautious trend in the building of nuclear power stations and in view of the supply situation in the natural uranium sector, only a few long-term supply contracts were concluded for natural uranium. On the other hand, an appreciable number of smaller short-term contracts were recorded. The Agency did not receive any direct orders for natural uranium procurement.
- (2) Even in the case of low-enriched uranium, there were no new agreements for long-term supply to Community consumers. In addition to the management of existing contracts, which, especially in connection with the granting of US export licences, involved further burdens, an outstanding feature of the Agency's activity in this field was the conversion of Long-Term Fixed-Commitment Contracts to the new type, the Adjustable Fixed Commitment contract. The assessment by the

electrical utilities in this context of the contractual situation and the long-term trend of demand also caused some customers to consider terminating contracts.

- (3) The demand for highly enriched uranium for Community research reactors and for other purposes remained fundamentally steady. However, in view of the changed criteria governing the supply of highly enriched uranium by the USA and having regard to the procedure to be observed under the Nuclear Non-Proliferation Act, the Agency's efforts needed to be appreciably increased in order to enter into and ensure the performance of the relevant contracts.
- (4) Furthermore, and in addition to extensive routine work, inter alia in connection with the operation of the Community's co-operation agreements with the USA and Canada, the Agency concentrated on observing and evaluating the nuclear fuel market and in particular the economic and political background situation which influenced and partly shaped it, as well as on informing and advising users and producers. The Agency was, moreover, involved to a considerable extent in the deliberations of the Commission concerning the future application of the provisions of Chapter VI of the Euratom Treaty on supply.

III

THE SUPPLY OF NUCLEAR FUELS

1. NATURAL URANIUM SECTOR

The market situation

The natural uranium market in 1978 was in general relatively quiet. The tendency which was seen in the previous year towards greater market equilibrium and a lessening of the "sellers market" increased. On the demand side, notably, there were some new developments to record, which led to a reduction in demand and which will not be without effect on the market. In this connection the delays and curtailments in the implementation of nuclear programmes are especially to be mentioned. Also the conversion of the US Long Term Fixed Commitment enrichment contracts into Adjustable Fixed Commitments enrichment contracts will result in a noticeable easing of demand. Part of the natural uranium becoming available in this connection will, however, certainly be used by electricity undertakings in the framework of their security policies to build up their stock position.

On the other hand in respect of the supply of natural uranium it is not so much an actual increase in production as the perspectives for future development which determine an assessment of the situation.

The main supplying countries remained Canada, South Africa, Namibia, Niger, Gabon and, of less importance for the supply of the Community, the United States. To these must be added France, the only noteworthy producer in the Community. There were no new supplying countries. Yet there were, however, developments on the producers' side which will be important for the extent of future supply. Foremost are the confirmation of the sizeable finds and the approval for the development of an additional deposit in Canada, as well as in Australia the solution of outstanding questions, which has created the essential pre-conditions for the definite investment decisions of individual producers. In Niger too development was such that it is becoming a producer country of growing importance. Finally it may be mentioned that

prospecting activities continued to develop in the world.

In this context it should be underlined how necessary it is for the security of future supply that producers remain confident in the future development of nuclear energy and in the framework conditions under which their considerable capital investments will be made. It is to be hoped that the current slowing down in demand, and the prospects of a considerable increase in production, does not lead to a reduction in prospecting activities, which result in supply difficulties in the 1990's.

The very recent past has shown that - irrespective of the overall macro economic conditions, which, for example, influence the energy demand - the continuity and stability of the determining factors required for long-range forecasts of supply and demand trends in the nuclear fuel sector are lacking, at least for the time being. In addition, as at the present time other unexpected difficulties in oil supply may arise which, combined with the upward movement of oil prices, may have repercussions on natural uranium demand and prices. A judgement on the future development of the uranium market, which, as stated, tended towards a state of better balance in 1978, is therefore and on account of the extremely complex nature of its different aspects affected by a large number of uncertainties.

According to the data to hand one can say, however, that in terms of basic world-wide uranium availability, scarcely any problems as regards a sufficient supply for the users in the Community up to the end of the 1980s and the beginning of the 1990s should arise. However, a fundamental distinction must be made between what is geologically proven and producible and the quantities which actually will be produced and delivered. There are many indications that the actual production will meet demand once long term contractual supply relationships between producers and users are established and the stability of future development improved. The users, however, will

only conclude long term contracts, if the security of delivery is guaranteed, essentially in respect of interruptions in supply and unilateral and unforeseen changes in the terms of supply imposed by the public authorities of the producing countries. In addition prices should reflect the long term nature of these contracts. This explains why the majority of buyers consider that the formula of full "world market price" effective at the time of delivery, accompanied invariably by a minimum price, but not a maximum price, is not a great incentive towards the conclusion of long term contracts, and that in return for the guarantees of long term sales security which they offer to the producers, the latter ought to be ready to accept more balanced formulae. The annual approval of prices by the authorities of certain producing countries with the financial uncertainties implied thereby may likewise act as a disincentive to the conclusion of long term contracts. Furthermore, attempted limitations on the right to transfer material are not looked upon favourably by users, as this takes no account of their justified interest in freedom of manoeuvre, for example for reasons of operational planning or in connection with security measures. In addition, limitations of this kind run counter to the principle of a common market for nuclear fuel in the Community.

Finally, it is crucial for users and producers, who wish to establish long term contractual relationships, that uncertainties as to later export approvals are removed as far as possible and that instead stable and reliable framework conditions are created.

However reassuring then, the further outlook for natural uranium supply may at present appear from its geological availability, this should not absolve us from being actively concerned about long-term security of supply. As seen by the consumers in the Community, who, owing to natural constraints, will become increasingly dependant on natural uranium imports, a continuing supply has to be assured by diversifying sources, guaranteeing access to production through direct or indirect participation and maintaining a certain stockpile.

In pursuance of non-proliferation, raw-material and energy policies, governments determine the framework within which the nuclear fuel supply is effected. To some extent they intervene directly and to some extent indirectly in the fuel cycle, and they lay down the conditions governing natural uranium supply both as regards guarantees of peaceful use and physical protection and regarding the actual use to the extent that restrictions are imposed. Such intervention and regulation extends also sometimes to pure commercial matters.

This specific relationship which characterizes nuclear fuel supply has in the last two years found expression, not only, as already mentioned in interruptions of delivery, but also in the formulation of certain clauses in many individual contracts. It is a major task of the Agency in these circumstances to ensure when signing contracts that no stipulations are included which conflict with the provisions of the Euratom Treaty, especially as regards the nuclear common market.

a) Canada

An important event in 1978 for the Community was the recommencement of uranium deliveries from Canada, which had been subject to embargo in 1977.

This was achieved as a result of agreement on an exchange of letters on 16 January 1978 between the Canadian Government and the Euratom Atomic Energy Community under which the agreement for co-operation on the peaceful use of atomic energy of 6 October 1959 was amended.* The agreement provides, inter alia, that during an interim period which runs to the end of 1980, but which can be extended, the parties will follow a procedure of notification/consultation if it is intended to reprocess or enrich to more than 20% the U²³⁵ content of or to store plutonium or highly enriched uranium derived from natural uranium of Canadian origin delivered after 20th December 1974.

* Official Journal of the European Communities of
8.3.1978 - No. L 65/16

In fact, the Community succeeded in rejecting the concept of "prior consent" which had been demanded by the Canadian authorities through an acceptable compromise solution. The initial experience of the implementation of the Interim Agreement, which has been undertaken in the framework of the provisions of the Euratom Treaty, so far has been that it has worked satisfactorily.

Of importance, however, for the practical application of the agreement by the industry and users is a regulation recorded in a technical note with respect to the mixing of materials of different origin. This so-called accounting principle assumes on the one hand that Canadian material on being mixed or combined with material of another origin does not lose its specific origin, but on the other hand that complete "contamination" does not take place, i.e. material brought into contact with Canadian material does not likewise receive the Canadian label. Rather, on a pro-rata basis a corresponding part of the new product will be deemed to be Canadian material. This basis will be used for conversion, fabrication, enrichment, reprocessing and irradiation. In practice some problems will certainly arise in the operation and application of this regulation and especially on the question of origin.

Experience during the year under review, however, on the other hand did not give sufficient indication, since deliveries under the new regime will not arise until this year. As it will be often unavoidable for technical reasons and often sensible for economic reasons to mix and process or to swap material of different origin, it is important for the industry and reactor operations that satisfactory and not too costly practices are developed. This is even more valid if one considers the additional problems of double-labelling, which as far as possible must be avoided, having regard to the application to all subsequent generations of conditions attaching to the material.

The discovery of large new high grade deposits, which was announced in 1978, coupled with the interest expressed (during a visit of representatives of the Supply Agency to the country) by the authorities and producers to supply Canadian uranium to users of the Community suggests that a substantial share of its market will continue to be supplied from Canada. It must be stressed, however, that there still remains some uncertainty about some of the commercial terms of the supply contracts, in particular on price, which according to procedures currently in force must be approved by the Canadian

authorities before an export licence will be issued. In this context sometimes a re-negotiation of the price will be necessary. An essential criterion applied by the government is that an export sale should not be made at a lower price than that for domestic sales. In this context the contracts recently concluded between Canadian companies in the past year could serve, according to some Canadian sources, as a basis for both the annual assessment of the Canadian price and the price mechanism. There was no change in the year under review in this Canadian policy of price approval.

Some flexibility has, however, been introduced into the procedures for the approval of contracts in that they now take into account the duration, the quantities covered and advance payments. Insofar as the Agency was able to follow, this flexibility was applied to old contracts.

The system of withholding a part of the Canadian production for domestic requirements is equally a cause for some uncertainty as regards the long term. The method of the practical application of this principle and especially the division of the national reserve holding among the different Canadian producers and their various mines should therefore also be subject to a large measure of flexibility and foreseeability. In particular for contracts concluded in advance of actual deliveries (some including advance payments) only the delivery years and not the total duration of the contract should be the ones to be taken into account for the 10 year maximum duration allowed.

b) Australia

Consequent upon the basic decision which had been reached in 1977 in favour of the exploitation of the Australian uranium resources, the developments in 1978 proceeded in this direction. The first application for the grant of a licence to develop a mine and milling plant successfully cleared all its hurdles. In the autumn of 1978 Ranger received a green light and since then approvals have been given for the Nabarlek project of Queensland Mines Ltd. and the Yeelirrie project of Western Mining. In respect of the sale of the Ranger production, which should commence in 1982 and reach a full capacity of 3300 short tons per year, it was decided that the three share-

holders (Australian Atomic Energy Commission 50% , Peko-Wallsend Ltd. 25% and EZ Industries Ltd 25%) should market their respective shares themselves.

In accordance with its non-proliferation policy, Australia concluded three agreements in 1978 concerning the transfer of nuclear material. In addition the Australian government has meanwhile provided that companies, which have received approval to exploit their deposits, may negotiate supply contracts with potential customers, even if the recipient country has not concluded a safeguards agreement. The supply contracts, however, must provide that actual delivery will be conditional upon the conclusion of such an agreement.

This provision may be of interest for users in the Community as negotiations on a Safeguards Agreement between the European Atomic Energy Community and Australia have not yet commenced. A mandate for this purpose has not yet been received by the Commission from the Council of Ministers.

On the other hand it should not be overlooked that it could be difficult for interested users to complete negotiations with a producer for, in some cases, deliveries planned over a very long term, if they do not know the conditions and possible restrictions which may result from the safeguards agreement concerning the use of the material. From the users side therefore it is being repeatedly stressed how urgent and important it is that the basic framework for the negotiation and conclusion of supply contracts shall be created as soon as possible.

Also important for the impending conclusion of, in particular, long term contracts is the implementation of the Australian export policy, which was announced in Parliament in June 1978 by the Australian Deputy Prime Minister and the Minister for Trade and Resources. By this means Australia, like Canada, will exercise in principle a control on the exploitation of the resources and the export of uranium, which is based not only on non-proliferation considerations but also includes raw materials policy aims and therefore touches on the commercial sector. The supply contracts will have to conform with certain general provisions and be subject to a procedure of approval.

A "Uranium Export Office", which in the meantime has been set up under the Ministry for Trade and Resources, will have the task of giving specialist advice on questions in this area. The role of the Office will be, in particular, to analyse information on supply of and demand for uranium from both Australia and other countries, the tendencies of the international market and to collect information on commercial transactions concerning the conversion and enrichment of Australian uranium within and outside the country.

c) Other Producers

The contracted supplies from other producing countries, notably Central and South Africa, continued without interruption.

d) New contracts

In 1978, 59 contracts were concluded under the procedures of the Agency by users in the Community. Of these 26 related to purchase or swap contracts for quantities of less than 20 t., while a further 20 contracts were for quantities in excess of 20 t. The majority of the deliveries under these contracts are to be made within 2 years. In addition, 13 contracts were signed relating to depleted uranium, mostly for small quantities. Only a few long term contracts for significant quantities were concluded and signed by the Agency. Nevertheless, their number is increasing compared to 1977. Moreover, several contracts have been renegotiated, in most cases at the request of the supplier, in order to obtain price adjustments.

The average price for deliveries in 1978 under spot contracts known to the Agency was \$ 43 per lb U_3O_8 . This figure relates to contracts where the period between signature and delivery does not exceed one year. The Agency regards this price as not being a suitable reference price for deliveries under long term contracts. The prices actually paid and known to the Agency for deliveries in 1978 under long term contracts confirm this view.

The total number of contracts so far submitted to and concluded by the Agency under the so-called simplified procedure at the year-end was 552. The quantities contracted for delivery, including options, amounted to

approximately 80,000 tonnes. According to contracts known to the Agency the requirements of users in the Community are in general covered up to the beginning of the 1980s.

2. SPECIAL FISSILE MATERIALS SECTOR

General survey

Nor did the market in enriched uranium and enrichment services undergo any appreciable structural changes in 1978. The USA and the USSR continued to be the Community's leading suppliers. Contrary to the situation in the natural uranium supply sector, where, owing to geological circumstances, the Community will remain dependent on imports, the trend in enrichment, which involves the use of a technology independent of location, is such that the European share is steadily growing. Furthermore, European enrichers will reinforce their efforts to export their own enrichment services and thereby contribute to a broader scope of supply with greater opportunities for diversification for the consumers.

Considerations as to the future trend are currently dictated by calculations which suggest that there will be some surplus separative work capacity up to about the end of the 1980s. Some consumers in particular have, it has been calculated, owing to the considerable cutbacks in the expansion of nuclear power station programmes, contracted for more enrichment services than they will need to operate their plants. Measures taken to redress this situation, such as a change of tails assay or an adjustment of contracts, are expected to have repercussions on the natural uranium market. Enrichment services contracted for but not used for actual operating purposes may subsequently come on the market as an additional source of supply.

Discussions in the Advisory Committee of the Supply Agency on questions relating to this imbalance between supply and demand in general left the impression that it was primarily the business of the parties directly affected to seek jointly satisfactory solutions. Whether in addition the chronic surplus arising from this situation should be linked to the problem of emergency stocks, which is being studied independently, has not yet been settled conclusively.

EURODIF

The construction of the 10 000 te sw/a gaseous diffusion plant at Tricastin continued according to schedule in the year under review. According to Eurodif trials carried out in the first section of the plant confirmed a satisfactory performance of the system. In the last quarter the commissioning of the installation was carried out.

1979 is the first year of commercial production. The company EURODIF PRODUCTION, a 100% subsidiary of EURODIF S.A., is responsible for the operation of the plant and has meanwhile initiated the start-up of the individual production stages.

The first unit of 280 diffusion stages commenced production in February 1979; a second group of 400 diffusion stages should reach its nominal capacity before the summer. Both units together will have an annual separative work capacity of 2.6 million SWUs. Around the middle of 1980 the third production stage should be brought into service, bringing the annual capacity of the plant to 6.3 million SWUs. The extension of the plant will be completed by the end of 1981 with the addition of a fourth production stage. From 1982 onwards the plant will be able to provide its nominal capacity of 10.8 million SWUs p.a.

In the first half of the 1980s this nominal capacity operated on the basis of a tails assay of 0.25% could result in an over supply for the EURODIF customers. On this subject EURODIF has expressed the following view: on account of contract flexibility regarding delivery off-take and with the possibility of adjusting the tails assay to below 0.2%, it should be possible to reduce the greater part of this excess capacity. Moreover, the stockpiling of product uranium would be a security measure, which is increasingly seen to be necessary as oil supplies become more uncertain. Finally a certain remaining excess in capacity in the enrichment industry would be an important factor with regard to security of supply and diversification.

In this context the current EURODIF policy can be summarised as follows:

- the plant at Tricastin will be completed as planned
- its flexibility in operation will be used to the maximum to suit the customers' situations
- new contracts can be concluded
- The COREDIF project will be held in readiness so that this new capacity can be made available in the second half of the 1980s. The period 1986-1988 seems to Eurodif at present to be the most appropriate time at which to bring into service the first production stage of the second European gaseous diffusion enrichment plant.
- The operation of both plants is planned so that capacity can be extended in stages according to need.

U R E N C O

Urenco's principal activities during the year have been the continuation of marketing and the continued installation and commissioning of capacity at its Almelo and Capenhurst sites. The three pilot plants, two at Almelo and one at Capenhurst have continued to function and provide useful additional capacity as well as being useful statistical test-beds. Throughout the year, centrifuge installation in the cascade halls continued in the 200 te sw/a plants at Almelo and Capenhurst. As each operating section is completed it is commissioned and becomes productive. Capacity thus rises in a series of steps and by the end of the year totalled around 300 te/a. According to indications from Urenco the plants performed excellently at above 99% capacity. Centrifuge failures have, as in previous years, averaged well under 1%.

Approximately 250 te sw were produced during the year of which approximately 10 te sw was delivered under contract. The remainder will be required for deliveries due under major contracts which commence in 1979 and 1980. Urenco is following a policy of exploiting the adjustment potential of centrifuge technology to the full and will only construct further plant where this is required by contractual commitments.

The contracts currently held require capacity to reach approximately 2500 te sw/a by 1985 and plant will be installed progressively to meet these requirements. The installation rate will be further increased as necessary as and when additional contracts are concluded.

During the year the next plant increments were approved. These are a 400 te sw/a plant at Almelo where the necessary soil improvement work is under way, and a 230 te sw/a plant at Capenhurst, where preparations have been made for a start of construction during 1979. In addition, the Urenco organisation decided on the need to construct a further plant in Germany, the approval for which has since been received.

Marketing has proved difficult in the current international nuclear climate. Nonetheless the order portfolio which stood at approximately 20,000 te sw at the beginning of the year was increased during the year by approximately 2000 te sw.

ENRICHMENT CONTRACTS WITH THE DEPARTMENT OF ENERGY

The central points in the implementation of enrichment contracts with the US DOE were, on the one hand, the question of the conversion of LTFC into AFC contracts and, on the other hand (but that applied in general to all the deliveries from the USA), the problems arising from the adoption and application of the Nuclear Non-Proliferation Act (NNPA).

The AFC contract was developed by the US DOE as the model contract for the new supply contracts. As no new contracts had been concluded in recent years, order books were reopened on 26 May 1978. What the new contract mainly offers the customer by comparison with the LTFC is more flexibility as regards the purchase of separative work, e.g., reduced delivery period in the case of firm commitments and facilities for deferment of deliveries. In addition, the new type of contract provides for the shortening of lead-times (not less than six years and not more than 10 years before the first scheduled delivery), offers flexibility as to the term of the contract and permits the unrestricted use of excess material.

After consideration had first of all been given to offering foreign customers the new AFC contract coupled with special conditions under the non-proliferation policy, all domestic and foreign consumers without distinction were subsequently offered the opportunity to convert existing LTFC contracts into AFC contracts and at the same time to avail themselves of a special, once only, deferment of delivery dates. The latter facility replaced the "open season", which had long been advocated by industry and under which the electricity utilities, affected by delays in the building and commissioning of nuclear power stations, would be entitled to adjust, on an ad-hoc basis, firm delivery dates specified in LTFC contracts.

Of the ten LTFC contracts held by the Agency at the beginning of 1978, two were terminated during the period under review on account of the projects being finally abandoned. In five cases, the DOE was notified of the contractor's desire to switch to the AFC type with simultaneous deferment of

the initial deliveries until 1985. Meanwhile, two more of these contracts have been terminated. Besides the three LTFC contracts which will be retained unchanged covering deliveries up to 1985 or 1995, there are four more such contracts of shorter duration which also will continue unaltered. No changes in requirements contracts were made during 1978.

The DOE's charges for enrichment services were raised again during the period under review. The price of US \$ 69.80 for requirements contracts on 1 January 1978 was progressively stepped up to US \$ 83.15 by 30 December 1978. The ceiling charge rose from US \$ 78.20 to US \$ 86.38 on 30 December 1978, an increase of 10.5%; on the actual price payable the increase amounted to 19.2%. The charge of US \$ 74.85 for LTFC contracts on 1 January 1978 climbed to US \$ 88.65 by 30 December 1978, i.e., by 18.4%. Since 1972 the price has roughly tripled which is essentially in consequence of the increase in energy costs to the enrichment plants but also which reflects certain changes in pricing policy. During the year, an attempt to introduce a "commercial" or "fair-value" price foundered in Congress. However, the DOE received permission to surcharge its natural uranium stockpiling costs by about US \$ 6/SWU, but this has not yet been put into effect. Altogether it is as difficult as before to compare the DOE's prices with those of other enrichers, who apply commercial price structures.

It should also be mentioned in this connection that in 1978 approximately US \$ 120 million was paid to the DOE in respect of material transfers under contracts concluded by the Agency and Community consumers with the DOE.

Problems concerning the application of the Nuclear Non-Proliferation Act

As already stated, the adoption of the Nuclear Non-Proliferation Act (NNPA) on 10 March 1978, gave rise to a multitude of practical difficulties in the implementation of contracts for deliveries of material from the USA, and in connection with the "MB 10 Procedure", under which US government consent is required for deliveries from or to third countries.

The immediate consequence of the entry into force of the NNPA was that the Nuclear Regulatory Commission (NRC) first of all ceased to issue licenses for the export of source materials and special fissile materials to the Community. The NNPA laid down six criteria for the issuing of export licenses, which in some cases went further than existing regulations

and unilaterally laid down, on the basis of the non-proliferation policy, new requirements concerning nuclear exports. As regards the materials concerned and especially the criterion of prior permission to reprocess, this field was (and is) not covered in respect of Euratom by the Agreement for Cooperation and the Additional Agreement between the USA and Euratom. This had been taken into account in the legislation, which accordingly laid down an exception (which, moreover, also applies to Canada and the IAEA), whereby the non-existence of the two abovementioned criteria would not prevent the issue of an export licence if the Secretary of State advised the NRC that the recipient in question (Euratom) had agreed to new negotiations on the existing Agreement for Cooperation.

The necessary conditions were fulfilled only on 7 July 1978, when the Community delivered a statement in which it made known its willingness to discuss these questions.

Interruptions in supply

In the period from 9 April 1978 to 13 September 1978, no export licences were issued. Twenty three consignments for the routine operation of 19 reactors in the Community were thereby affected. While this did not result in any shut-down or slackening of operation, it nevertheless caused the operators considerable work and in some cases also expense, on alternative arrangements in order to meet contractual obligations, e.g., towards fuel element fabricators. Added to this was the fact that in spite of the disruptions in the procedures for the issuing of export licenses, the contractual obligations for the customer still remained, because of the different responsibilities on the one hand for the supply contract (DOE) and on the other hand for the export licence (NRC). Operators were thus obliged to meet the commitments arising from a supply contract in regard to prompt delivery of feed materials, acceptance of the enriched material and the relevant payments without actually being able to export the material because under the applicable contractual provisions the responsibility for obtaining the export licences and other administrative authorizations lies with the customer, who is subject to US law. Holders of requirements contracts were faced with the additional problem that, owing to the exclusion arrangements in this type of contract, they were legally barred from using substitute material from other sources.

Irrespective of the fact that clarification of these questions under

civil law, for which the Supply Agency had started making preparations, became no longer necessary and that the DOE, within the limits of its means contributed to securing pragmatic solutions, this experience nevertheless gives an inducement to examine not merely the entire complex of questions but also how the repercussions of a unilateral alteration of the requirements and conditions of a non-proliferation policy affecting deliveries and supply contracts can be avoided or mitigated. It is also important to ensure at the stage of drafting the supply contracts that the consequences of the refusal of an export licence (likewise based on such new requirements) are not borne by the customer. In such cases the customer should be exonerated from the obligation to deliver the feed material (he may need this uranium in order to adopt alternative solutions); he should not be obliged to accept the product material and should therefore be exonerated from payment and should be free to use substitute material. Subsequently, when the material is free to be exported, he should be entitled to reject or transfer this material at no expense if, by reason of interim substitute solutions it is no longer required by him for his own purposes.

Export Licences

The second problem posed by the Nuclear Non-Proliferation Act is that of the actual processing of the applications for the issue of the export licence. Here, not only do difficulties arise through the fact that the implementation provisions and interpretations have not yet been finalized or are still of a very general character but also, owing to the complex procedural structure in which many authorities are involved, the result has sometimes been appreciable delays. In the interests of the reliable processing of contracts, with which a number of consequential commitments are linked over time (e.g. transport conversion fuel element fabrication), the view of industrial undertakings and customers is that improvements in this state of affairs are essential.

Master Sales Agreement

A further consequence of the entry into force of the NNPA is that the Master Sales Agreement, concluded with the US AEC by the Agency in 1969, with a view to simplifying the purchase of special nuclear material for use in specific research applications in the Community, could not be extended beyond 30 December 1978. Under the new legislation, a so-called "subsequent

arrangement" is in fact necessary for each individual contract, because certain procedures must be observed which provide for, among other things, the publication of a statement from the Department of Energy in the Federal Register to the effect that such an agreement (e.g., supply contract) "is not prejudicial to common defence and security". In such cases too, therefore, the Supply Agency will in future conclude supply contracts with the DOE on a case by case basis.

Supply of highly enriched uranium

As regards the procurement of highly enriched uranium (HEU) from the USA, further aggravations were experienced in the period under review. For consumers in the Community, i.e., predominantly for research applications or transformations for customers in other countries, the DOE has so far offered practically the only possibility of supplying HEU in the required quantities. The average demand can be put at about 500-600 kg/yr. The HEU is supplied under the Additional Agreement for Cooperation between the USA and Euratom, pursuant to which HEU can be supplied if the use of the material is technically or economically justified. In an exchange of letters on the occasion of the conclusion of the Additional Agreement in 1972, the then USAEC confirmed "that the Commission will continue to give sympathetic consideration to requests for supply of highly enriched fuel to the Community".

New criteria and procedures for the supply of HEU were laid down by the DOE in December 1977 in connection with a review of US non-proliferation policy. A revised version of these provisions was published in the spring of 1978. Under the new criteria the policy is to reduce supplies of highly enriched uranium outside the USA and to identify facilities in which the conversion to low-enriched uranium is technically and economically feasible. Facilities which have up to now received HEU are to be encouraged in such cases to undertake such a conversion operation.

Applications for the issue of an export licence for HEU must therefore be based on a very detailed check-list of HEU requirements and contain all particulars of the reactor, the research programme, substitutability, HEU stocks, etc. The new procedure rules provide, in particular, that individual contracts for the supply of highly enriched uranium, which involve an

application for an export licence, can be concluded only if the Administration has delivered a favourable opinion to the NRC.

The procedure in the Executive Branch, which starts with a comprehensive review of the application at the Argonne Laboratory, provides for approval by the President in cases where the individual quantity to be supplied exceeds 15 kg, or where after the delivery the quantity of HEU in the recipient country would exceed 15 kg. By a rough calculation, which takes account of previous experience, one arrives at a period of 320 days between the submission of the application and delivery of the product in cases where approval by the President is not required, and of 440 days when the 15 kg limit is exceeded. These long lead times, the appreciable expense entailed by the preparation of the application and the actual procedure, together with the fact that experience to date does not constitute a reliable basis on which to assess the prospects for the successful outcome of an application, all give rise to difficult problems for the consumers as regards the future security of HEU supply. During the period under review, the Supply Agency has taken an active part in the current procedures and has helped to find certain ways and means, at least on the contractual level, of creating conditions for obtaining supplies.

In 1978, 13 new export applications were submitted for a total quantity of \pm 1,220 kg. In all, 22 applications in respect of 1,390 kg were still pending with the American authorities on 30 December 1978. The Supply Agency has been involved in the conclusion of 20 contracts, some of which provide for subsequent deliveries to non-member countries, with an aggregate volume of about 680 kg. Only one substantial consignment came from the USA in 1978.

New contracts and other activities

In addition to the changes referred to previously concerning LTFC contracts with the DOE, the Supply Agency participated during the period under review in the conclusion of 9 contracts for the supply of enriched uranium (20% enrichment) totalling 13,000 kg and of 5 contracts for enrichment services. Nine other contracts were for the sale of plutonium. Plutonium prices were mainly unchanged in 1977; i.e. depending on quantity, isotopic composition, chemical form and other relevant conditions, the price is usually US \$ 10-15 per gramme of fissile material.

The Supply Agency was also involved to a considerable extent in 1978 in the MB-10 procedure, under which the authorisation of the US authorities

is given for the transfer of nuclear material of American origin from the Community to non-Community countries or vice-versa. This procedure too was revised with the entry into force of the Nuclear Non-Proliferation Act; in particular for transfers for the purpose of reprocessing or disposal of plutonium, very detailed conditions and more formalities have been laid down. Apart from the resultant delays in individual cases and the fact that the required authorisation is often given only at the last minute, the tightening-up of the procedures naturally involve all concerned in additional administrative burdens.

In addition - and this is immediately clear from the rising number of notifications received by the Supply Agency in pursuance of Article 75 of the Euratom Treaty - the Community nuclear industry is increasing its export business. This should provide an inducement for discussing jointly with the USA (but this also applies to other nuclear material suppliers) whether the procedures under which a retransfer approval is given could not be improved, so as to simplify them as much as possible in order not to hamper the worldwide expansion of nuclear energy markets.

ADVISORY COMMITTEE OF THE SUPPLY AGENCY

In accordance with its Rules of Procedure, the Advisory Committee elected Mr. Bastrup-Birk as Chairman and Mr. Daniel and Mr. Minnard as Vice-Chairman for the current year.

The Committee met three times in 1978. Most of its discussions were centered on the supply situation in the Community, special attention being given to trends in the enrichment field. On this subject, the Supply Agency had compiled information which provided, in addition to a quantitative description of the present supply position and an assessment of the future trend, a qualitative evaluation of the factors affecting supply and demand. It became evident from discussions in the Committee and its Working Party that the Supply Agency should further improve its information basis and evaluation methods, so that at certain intervals a corresponding survey may be made, which, among other things, will serve as a basis on which the Committee may discuss, and, if appropriate, may make recommendations on the supply situation in the Community.

In addition, following an exchange of views in the Energy Committee of the Council, the Committee has been engaged in questions concerning the promotion of uranium prospecting outside the Community, on which the Commission's services had sought specialist advice.

Brussels, April 1979

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APPENDIX

Nuclear Reactors in the European Communities

<u>Reactor</u>	<u>Country</u>	<u>Type</u>	<u>In operation</u>	<u>Net installed power</u>
Calder Hall (BNFL)	UK	GG	1956 à 59	200
Chapelcross (BNFL)	UK	GG	1959 à 60	200
G2 Marcoule (CEA)	F	GG	1959	40
G3 Marcoule (CEA)	F	GG	1960	40
VAK (Kahl)	D	BWR	1961	15
Berkeley (CEGB)	UK	GG	1962	275
Bradwell (CEGB)	UK	GG	1962	300
Latina (ENEL)	I	GG	1963	200
Windscale (UKAEA)	UK	AGR	1963	33
Hunterston A (SSEB)	UK	GG	1964	320
Garigliano (ENEL)	I	BWR	1964	150
Trino Vercel. (ENEL)	I	PWR	1964	247
Chinon 2 (EDF)	F	GG	1965	200
Chinon 3 (EDF)	F	GG	1966	480
Hinkley Point A (CEGB)	UK	GG	1965	500
Trawsfynydd (CEGB)	UK	GG	1965	500
Dungeness A (CEGB)	UK	GG	1965	550
Sizewell A (CEGB)	UK	GG	1966	580
MZFR (Karlsruhe)	D	EL	1966	51
BR 3 (Mol)	B	PWR	1966	10
KRB (Gundremmingen)	D	PWR	1966	237
SENA (Chooz)	F	PWR	1967	305
Winfrith (UKAEA)	UK	EL	1967	92
EL 4 (Monts d'Arrée)	F	EL	1967	70
Oldbury-on-Severn A (CEGB)	UK	GG	1967	600
AVR (Jülich)	D	HTR	1967	13
KWL (Lingen)	D	BWR	1968	182
KWO (Obrigheim)	D	PWR	1968	328
GKN (Dodewaard)	N	BWR	1968	52
St. Laurent 1 (EDF)	F	GG	1969	480
St. Laurent 2 (EDF)	F	GG	1971	515
Wylfa (CEGB)	UK	GG	1971	840
KWW (Würgassen)	D	BWR	1972	640
KKS (Stade)	D	PWR	1972	630

KNK II (Karlsruhe)	D(xx)	FBR	1977	19
Bugey 1 (EDF) Rhône	F	GG	1972	540
KCE (Borsele)	N	PWR	1973	450
Phenix (Marcoule)	F	FBR	1973	233
PFR Dounreay (UKAEA)	UK	FBR	1974	250
Biblis A - RWE (Rhin)	D	PWR	1974	1146
Doel 1 (Escaut)	B	PWR	1974	390
Tihange (Meuse)	B	PWR	1975	870
Doel 2 (Escaut)	B	PWR	1975	390
Hinkley Point B1	UK	AGR	1976	625
Hunterston B1	UK	AGR	1976	625
Biblis B - RWE (Rhin)	D	PWR	1976	1178
GKN 1 Neckarwestheim	D	PWR	1976	810
KKB Brunsbuttel	D	BWR	1976	770
Hinkley Point B2	UK	AGR	1976	625
Fessenheim 1	F	PWR	1977	890
Hunterston B2	UK	AGR	1977	625
Fessenheim 2	F	PWR	1977	890
KK1 Ohu (Isar)	D	BWR	1977	870
Enel 4 Caorso (Pô)	I	BWR	1977	840
Bugey 2	F	PWR	1978	925
KWU Unterweser	D	PWR	1978	1230
Bugey 3	F	PWR	1978	925

26331

(xx) since 1977 equipped with a fast core

*) GG = Gas graphite AGR = Advanced Gas Cooled Reactor
 BWR = Boiling water reactor PWR = Pressurised Water Reactor
 HTR = High temperature reactor HWR = Heavy Water reactor
 FBR = fast Breeder

